ALGEBRA

$C \to 1$

1. $(a + b)^2 = a^2 + 2ab + b^2$

2. $(a - b)^2 = a^2 - 2ab + b^2$

3. $(a + b)^2 = (a - b)^2 + 4ab$

4. $(a - b)^2 = (a + b)^2 - 4ab$

5. $a^2 - b^2 = (a + b)(a - b)$

6. $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

7. $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

8. $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$

9. $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

10. $a^3 + b^3 = (a + b)^3 - 3ab(a + b)$

11. $a^3 - b^3 = (a - b)^3 + 3ab(a - b)$

1. If $\chi + \frac{1}{\chi} = 15$ then the value of $(\chi^2 + \frac{1}{\chi^2})$ is

(A) 223 (B) 225
(C) 13 (D) 17

SSC CGL 2024

$$\left(x + \frac{1}{x}\right)^2 = (15)^2$$

$$\Rightarrow x^2 + \frac{1}{x^2} + 2 \cdot x \cdot \frac{1}{x} = 225$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 225 - 2$$

$$= 223 \quad A$$

$$x + \frac{1}{x} = n$$

$$x^2 + \frac{1}{x^2} = n^2 - 2$$

1. If $\chi + \frac{1}{\chi} = 15$ then the value of $(\chi^2 + \frac{1}{\chi^2})$ is

(A) 223
(B) 225
(C) 13
(D) 17

SSC CGL 2024

$$x + \frac{1}{x} = 15$$

$$x^2 + \frac{1}{x^2}$$

$$= \left(x + \frac{1}{x}\right)^2 - 2 \cdot x \cdot \frac{1}{x}$$

$$= (15)^2 - 2$$

$$= 225 - 2 = 223$$

$$a^2 + b^2$$

$$= (a+b)^2 - 2ab$$

$$= (a-b)^2 + 2ab$$

2. If $\chi + \frac{1}{\chi} = 3$ then find the value of $\chi^2 + \frac{1}{\chi^2}$

(A) 7 (B) 8

(C) 9 (D) 9

RRB GROUP D 2022

$x^2 + \frac{1}{x^2} = 9 - 2$

$= 7$ A

3. If $\chi + \frac{1}{\chi} = 7$ then find the value of $\chi^2 + \frac{1}{\chi^2}$ is

(A) 49

(B) 51

(C) 47

(D) 5

SSC CHSL 2023

4. If $a + \frac{1}{a} = 5$ then find the value of $a^3 + \frac{1}{a^3}$?

(A) 140

(B) 110

(C) 120

(D) 130

RRB GROUP D 2018

$$\left(a + \frac{1}{a}\right)^3 = (5)^3$$

$$\Rightarrow a^3 + \frac{1}{a^3} + 3 \cdot a \cdot \frac{1}{a}\left(a + \frac{1}{a}\right) = 125$$

$$\Rightarrow a^3 + \frac{1}{a^3} + 3(5) = 125$$

$$\Rightarrow a^3 + \frac{1}{a^3} = 110$$

$$a + \frac{1}{a} = 5$$

$$a^3 + \frac{1}{a^3}$$

$$= \left(a + \frac{1}{a}\right)^3 - 3 \cdot a \cdot \frac{1}{a}\left(a + \frac{1}{a}\right)$$

$$= (5)^3 - 3(5)$$

$$= 125 - 15$$

$$= 110$$

4. If $a + \frac{1}{a} = 5$ then find the value of $a^3 + \frac{1}{a^3}$?

(A) 140 (B) 110

(C) 120 (D) 130

RRB GROUP D 2018

$$a + \frac{1}{a} = n$$

$$a^3 + \frac{1}{a^3} = n^3 - 3n$$

4. If $a + \frac{1}{a} = 5$ then find the value of $a^3 + \frac{1}{a^3}$?

(A) 140

(B) 110

(C) 120

(D) 130

RRB GROUP D 2018

$$(5)^3 - 3(5)$$

$$= 125 - 15$$

$$= 110 \text{ (B)}$$

$$a + \frac{1}{a} = n$$

$$a^3 + \frac{1}{a^3} = n^3 - 3n$$

5. If $\chi + \frac{1}{\chi} = 7$ find the value of $\chi^3 + \frac{1}{\chi^3}$?

(A) 343
(B) 332
(C) 340
(D) 322

SSC CGL 2024

$$(7)^3 - 3(7)$$

$$= 343 - 21$$

$$= 322$$ A

6. If $\chi + \frac{1}{\chi} = 2$, then the value of $\chi^4 + \frac{1}{\chi^4} =$ ____

(A) 0

(B) 2

(C) -1

(D) 1

SSC DELHI POLICE SI 2022

$x + \frac{1}{x} = 3$

$x^2 + \frac{1}{x^2} = (3)^2 - 2 = 7$

$x^4 + \frac{1}{x^4} = (7)^2 - 2 = 47$

$\Rightarrow x^8 + \frac{1}{x^8} = (47)^2 - 2$

6. If $x + \frac{1}{x} = 2$, then the value of $x^4 + \frac{1}{x^4} =$ ____

(A) 0
(B) 2
(C) -1
(D) 1

SSC DELHI POLICE SI 2022

$x + \frac{1}{x} = 2$

$x = 1$

$x^4 + \frac{1}{x^4}$

$= (1)^4 + \frac{1}{(1)^4}$

$= 1 + 1$

$= 2$

$x^2 + \frac{1}{x^2} = (2)^2 - 2 = 2$

$x^4 + \frac{1}{x^4} = (2)^2 - 2$

$= 2$

6. If $\chi + \frac{1}{\chi} = 2$, then the value of $\chi^4 + \frac{1}{\chi^4} =$ ____

(A) 0
(B) 2
(C) -1
(D) 1

SSC DELHI POLICE SI 2022

$x + \frac{1}{x} = 2$

$x^2 + \frac{1}{x^2} = (2)^2 - 2 = 2$

$\left(x^2 + \frac{1}{x^2}\right)^2 = (2)^2$

$= (x^2)^2 + \left(\frac{1}{x^2}\right)^2 + 2 \cdot x^2 \cdot \frac{1}{x^2} = 4$

$= x^4 + \frac{1}{x^4} = 2$ A

$x^2 + \frac{1}{x^2} = 2$

$x^4 + \frac{1}{x^4}$

$= (x^2)^2 + \left(\frac{1}{x^2}\right)^2$

$= \left(x^2 + \frac{1}{x^2}\right)^2 - 2 \cdot x^2 \cdot \frac{1}{x^2}$

$= (2)^2 - 2$

$= 4 - 2$

$= 2$ A

7. If $\left(x + \frac{1}{x}\right) = 5\sqrt{2}$, then what is the value of $(x^4 + x^{-4})$?

$= x^4 + \frac{1}{x^4}$

(A) 2542
(B) 2650
(C) 2452
(D) 2302

SSC CGL 2022

$x + \frac{1}{x} = 5\sqrt{2}$

$\Rightarrow x^2 + \frac{1}{x^2} = (5\sqrt{2})^2 - 2$

$= 50 - 2 = 48$

$x^4 + \frac{1}{x^4} = (48)^2 - 2$

$= 2304 - 2$

$= 2302$ A

13. If $x + \frac{1}{x} = 2$, then find the value of

$$\left(x^3 + \frac{1}{x^3}\right) \div \left(x^{18} + \frac{1}{x^{18}}\right)$$

(A) $\frac{2}{9}$

(B) 5

(C) 1

(D) $\frac{1}{9}$

RRB NTPC 2018

$x = 1$

$$\left(1^3 + \frac{1}{1^3}\right) \div \left(1^{18} + \frac{1}{1^{18}}\right)$$

$$= 2 \div 2 = 1$$